

of matrix adhering to it, which render identification difficult. Prof. de Koninck states that the surface is ornamented with fine and irregular striæ of growth, which on the keel of each whorl are bent backwards, indicating the presence of a sinus in the outer lip. The striæ are not preserved in our specimen; but the keel is well exposed, and forms quite a projecting rim along the periphery of each whorl. In all probability it is either a *Murchisonia* or *Pleurotomaria*, perhaps the former, as it cannot in any way be considered congeneric with such forms as *Natica elliptica*, *N. elongata*, &c. It is the

Natica tabulata, Phillips, as above.

Ampullacera tabulata, De Koninck, Animaux Foss. p. 488, t. 42. fig. 4, a, b.

XXXVI.—On the Antipatharia (*Milne Edwards*), with reference to *Hydradendrium spinosum*. By H. J. CARTER, F.R.S. &c.

IN a late communication from the Rev. A. M. Norman, a very significant and proper question is put to me, viz.:—"Your *Hydradrendrium* (Ann. 1880, vol. v. p. 454, pl. xix. fig. 8 &c.)—have you compared this with *Antipathes*? it looks uncommonly like one." In reply, I could only state that I had not done so—and for the simple reason that, not having specially given my attention to the Anthozoa, I had always regarded *Antipathes* as allied to *Gorgonia*, and therefore in no way connected with the Hydrozoa, of which I conceived *Hydradendrium spinosum* to be one, and had named it accordingly.

But the significance and propriety of the question coming from such high authority was immediately realized when I referred to Ellis's illustrations of *Antipathes*, among which *A. ulex* appeared to me to be identical in form with *Hydradendrium spinosum*; so the idea as quickly flashed upon me that *Antipathes* itself, after all, might be a Hydroid Cœlenterate.

The next step was to compare, as Mr. Norman had suggested, the Manaar specimen with different species of *Antipathes*. But here my resources entirely failed; and I was thus thrown back upon the literature of the subject, viz. Pallas*, Ellis and Solander†, Lamouroux‡, De Blainville§, and, lastly,

* Elenchus Zoophytorum, 8vo, 1766.

† Nat. Hist. of Zoophytes, 4to, 1786.

‡ Corallina or Flexible Corallines (Engl. transl.), 8vo, 1824

§ Manuel d'Actinologie, and Atlas, 8vo, 1834.

Milne-Edwards and Jules Haime*, by which I observed that, throughout, the words of the latter (who wrote after Dana) were verified, viz. :—"Jusqu'ici on n'a pas étudié l'anatomie de ces animaux, et on ignore la disposition des lamelles mésentéroïdes et des organes générateurs;" so that, as regards the nature of *Antipathes*, I am just as well off without the actual specimens, since in possessing Pallas's accurate descriptions and Ellis's reliable illustrations I have as much as the specimens themselves would present. In short, hardly any thing more than I have stated of *Hydradendrium spinosum* has, to the best of my knowledge, been published of *Antipathes* except Ellis's figures of the supposed polyp, which have more a Hydroid than an Actinozoid character.

All are agreed, from Pallas downwards, that the cortex "non calcareus est; sed gelatinosum tegumentum, in extremis ramis crassius, inque polypos efflorescens. Hoc quidem cortice, utpote putrescibili, in Museis adservata specimina fere semper orbata videntur" (*op. cit.* p. 206). Lamouroux observes that the gelatinous or exterior polypiferous portion almost wholly disappears on desiccation (*op. cit.* p. 189). Consequently the polyps have never been satisfactorily examined; and the only original† figures of them given by the authors above mentioned (which consists of nothing but the mouth and tentacles) are those of Ellis, to which I have alluded (*op. cit.* tab. 19. figs. 4, 5), which were obtained by "examining in the microscope some of the warts that covered a specimen of *Antipathes spiralis* lately brought from the East Indies, and soaked for some time in warm water" (p. 98); while a section of the horny axis, by the same author (p. 6), shows that it is composed of concentric layers which, when torn asunder, present the same kind of spiniferous surface as that of the last-formed or outside one of the stem itself; hence, in this respect, it resembles the layers of *Hydractinia levispina* (Ann. 1873, vol. xi. pl. i. fig. 2, c, d).

Now, although the concentric lamination of the kerataceous axis of *Antipathes* is like that of *Gorgonia*, this, together with its spiniferous surface covered with a gelatinous layer of extreme tenuity which almost wholly disappears on desiccation, is much more like a Hydroid Cœlenterate, ex. gr. *Hydractinia echinata*, and especially *Hydradendrium spinosum*, than *Gorgonia*, whose cortex and polyps, which are Actinozoid, are for the most part almost as persistent as the horny axis itself; so that if I am wrong in having broken the rules of

* Histoire des Zoophytes, Coralliaires, and Atlas, 8vo, 3 vols., 1857.

† Milne-Edwards's are copied from Dana. See at the end of the "Postscript."

precedence in nomenclature by applying a new term to an already named object, it is possible that I am not so in ascribing to it a Hydroid nature.

Hence comes the question, whether *Antipathes* ought not to be considered a genus of the Hydractiniidæ. Certainly Ellis's figure of the supposed polyp before mentioned is much more like that of a Hydrozoon than of an Actinozoon. But here again priority steps in, and Pallas can claim the right of having first used the term "*Antipathes*" for this Cœlenterate; so that, complying with this obligation, the whole family instead of being called "Hydractiniidæ," would have to be called "Antipathidæ," or some such word, thus sacrificing a name which carries with it the meaning of the objects it represents to one which has no significance at all, at least at the present day, when things, if possible, are named after their "nature" rather than their resemblances.

I do not know who first pointed out the likeness of some of the polyps to *Hydra* in contradistinction to those which are more allied in their structure to *Actinia*; but both Ehrenberg and De Blainville appear to have been conscious of the distinction; for the latter in 1834 stated that Ehrenberg's Bryozoa correspond "*à peu de choses près à nos Polypiaires*" (Actinologie, p. 682), and les Polypiaires (Polypiaría) are designated by De Blainville as "*animaux hydriformes*" (p. 399), of which the first family is "*Millepora*." But it is to Prof. Huxley that we are mainly indebted for the use of the term "Hydrozoa" (in 1859, Ray Soc. Publ.), afterwards clearly defined and illustrated by him, in contradistinction to the Actinozoa, in his 'Introduction to the Classification of Animals' (1869, pp. 21-24). Latterly the appropriate term "Hydrocorallinæ" has been proposed for the stony Hydrozoa by Mr. H. N. Moseley, F.R.S. (Phil. Trans. vol. clxvii. pt. 1, 1877, p. 132); and thus by degrees the Hydroid are being separated throughout from the Actinozoid forms of the Cœlenterata.

May we hope that there are some well-preserved specimens of *Antipathes* among the 'Challenger' collections? for it is only by such, or by examining them in their living state in their native element, that we shall ever know what the nature of the polyp is, viz. whether Hydroid or Actinozoid. This has been well exemplified in two specimens of *Hydractinia echinata* on whelks (*Buccinum undatum*) which were brought to me alive, one of which I dried, while the other, with its polyps fully expanded in its own element, was plunged in this state into spirit and water,—in which instances the former, from the extreme tenuity of the sarcodic investment,

looks as if it never had any, and the latter is almost unaltered, in the form and position of its polyps, from what it was when living and fully expanded in the sea-water. Thus, as the theca or sarcodic covering of *Antipathes* appears to be of the same nature, it would seem to be useless to seek for the form and structure of the polyps after the sarcode has once been broken down by desiccation. That is therefore now the great desideratum*.

The thread-cells, as they are much tougher and therefore more durable, may generally be detected; at least they exist in the dried remains of the sarcode on *Hydradendrium spinosum*, where, with all appliances, I have not been able to get out the form of the polyp. It may be remembered that I also found them in a dried specimen of *Ceratella procumbens* (Hydractinian) ('Annals,' 1873, vol. xi. p. 11), although this specimen had probably been picked up on the beach at Port Natal, in which way, also probably, most of the specimens of *Antipathes* have come into the museums, when the delicate layer of sarcode which covered them would stand little chance of preservation, exposed to the scouring effect of the sand and waves together.

There is one point in *Antipathes*, as well as in the Hydractinian *Ceratella fusca*, that should be mentioned here: viz. Pallas states that, although the flesh may be absent, the spines remain to diagnose the species (p. 207); but Lamouroux observes that they are "rarely smooth"—that is, sometimes without spines (p. 189); and Milne Edwards confirms this (vol. i. p. 312); while I have already observed that *Ceratella fusca* &c. have none ('Annals,' 1873, vol. xi. p. 12), assuming that *Hydractinia* and *Antipathes* belong to the same family. If Pallas has erred in this matter, Milne-Edwards has done no less so in mixing up *Hyalonema Sieboldi* with *Zoanthus* at the end of his *Antipathes* (p. 324). But "to err is human," especially in a progressive subject like natural history.

POSTSCRIPT.

Since the above was written, Mr. Thomas H. Higgin, F.L.S., has kindly sent me several species of *Antipathes* for examination, with reference to *Hydradendrium spinosum* stating that, "if the latter belongs to the Hydractiniidæ, so do all our specimens of *Antipathes*, which at present we have near the Gorgoniidæ, in the Liverpool Free Museum; and if you are right, then will all require removing."

* [The author unfortunately does not seem to have consulted Lacaze-Duthier's classical memoirs "Sur les Antipathaires," in the 'Annales des Sciences Naturelles,' ser. 5, Tome ii. p. 169, and Tome iv. p. 1. Had he done so, his doubts as to the organization of the polyps might have been set at rest.—Ed's. A. M. N. H.]

All these specimens are more or less like *Hydradendrium spinosum*; but on one of them (no. 14. 6. 61. 2, without name), which appears to have undergone better preservation than the rest, there is a thick light-brown sarcodic theca, which is uniformly inflated at short intervals over the branches, so as to present a succession of fusiform swellings averaging about 1-415th inch in their shortest diameter. When a bit of the branch bearing one of these swellings, after having been softened by soaking in spirit and water for twenty-four hours, is placed under the microscope and examined with a 1-inch object-glass, it may be observed to consist of a transparent sarcodic base densely charged with opaque white granular matter arranged in reticulated lines, which, on being further magnified, viz. under $\frac{1}{4}$ -inch object-glass, presents a variety of cellular forms in great plurality and of different sizes, among which the most noticeable are:—1, a discoid body with crenulated margin and central circular area, about 5-6000ths inch in diameter; 2, a pyriform body about 6-6000ths inch long; and, 3, ovoid thread-cells about 3-6000ths inch in their greatest diameter, together with other minute forms which may or may not belong to a *Penicillium* with which the sarcode is permeated. But it is the fusiform inflations themselves on the branches which command our attention most; for they appear to have contained the full-grown polyp, of which, however, nothing now can be seen but a slight depression on the most prominent part here and there, bearing no resemblance whatever to the radiated actinozoic form of the polyp in the theca of a *Gorgonia*; nor, as above stated, are we likely to find any thing more, unless the specimen be seen in its active living state in its own element, or after having been properly preserved in spirit and water, in the manner of that of *Hydractinia echinata* above mentioned. Dana's figures *apud* Milne-Edwards (*op. cit.* Atlas, pl. C. 2. figs. 5, 6) show nothing more than Ellis's, viz. that the polyp's head has six tentacles.

XXXVII.—*The Chalk Bluffs of Trimmingham.*

By A. J. JUKES-BROWNE, B.A., F.G.S.

THE existence of certain isolated masses or bluffs of chalk on the shore near Trimmingham, in Norfolk, has long been known to geologists. They are partially buried under the deposits of the Lower Glacial series, which here form cliffs of considerable height, and founder down from time to time in great landslips, so that a clear section from top to bottom is rarely exhibited. Many writers have described these masses of